

Quarterly Report
July 1, 2004 to September 30, 2004

Project Title

Warm Water Species Fish Passage in Eastern Montana Culverts

Principal Investigators

Dr. Joel Cahoon, P.E., Ph.D.
Civil Engineering Department

Dr. Thomas McMahon, Ph.D.
Fish and Wildlife Science

Otto Stein, Ph.D.
Civil Engineering Department

Jarrett Barber
Math and Statistics

Research Assistants

TBA, Civil Engineering

TBA, Fish and Wildlife Science

Introduction

This progress report covers work completed between July 1, 2004 and September 30, 2004. This is the first quarterly report since August 1, 2004 - the official start date of the project. Work on the project during this period has been primarily devoted to student recruitment, literature review and equipment selection.

Project Objective

Culverts are a common and often the most cost effective means of providing transportation intersections with naturally occurring streams or rivers. Fish passage and fish habitat considerations are now typical components of the planning and design of waterway crossings. Many culverts in Montana span streams that support diverse fisheries. The health of these fisheries is an essential element of a recreational industry that draws hundreds of thousands of visitors to Montana annually. Additionally, there is growing recognition of the value of native Montana species, some of which are considered 'species of special concern' in the state. In recent years these concerns have become apparent for warm water species in low gradient, high sediment bearing, intermittently flowing streams that are typical of eastern Montana.

Transportation system planners, designers and managers recognize that fish passage through Montana's culverts is a concern. However, there is much contention concerning the impact that a culvert can have on a fishery. Recent basin-wide studies of various trout species that we conducted in western Montana indicate that the tools that some planners and designers promote for forecasting fish passage concerns may be overly conservative. Which species, life stages, and how many individuals must have fish passage access for how long, are questions that are often brought forward during discussions on the design and retrofitting of culverts to accommodate fish passage

concerns. *The problem is that for warm water fish species and settings in eastern Montana, the timing and number of fish that must pass a culvert to maintain viable species diversity in the watershed is unknown, and the physiologic abilities of these species relative to such common fish passage questions are often unknown.*

Progress

Personnel A nationwide announcement for a fisheries graduate student was sent out in early September and we have already received applications from several strong candidates. We will begin interviewing prospective candidates in mid October with the intent of the student being on board by January 1, 2005. A similar recruiting effort is underway to identify an engineering student to work on the project. We welcome Jarrett Barber to the fish passage team at MSU, he is a new faculty member in the Math and Statistics Department.

Equipment We have met with Dr. Bob Gresswell, formerly with the US Geologic Survey at Oregon State University, where he conducted long term, large scale studies on movement of cutthroat trout in Oregon streams using PIT tags and fixed antennas. Dr. Gresswell used Texas Instruments half-duplex PIT tags in combination with antennas that were built in-house. Bob found the detection distance of PIT tags using this system was increased over traditional off-the-shelf full duplex PIT tags, which are more sensitive, but have reduced detection distance. Since detection distance is an important factor in our culvert studies, we are further exploring which system might be most suitable for our needs.

Literature Review A literature review turned up little new information that was not already documented in Tillinger and Stein, 1996. One study (Peak et al., 200x) confirmed the swimming velocities of walleye that were reported in Tillinger and Stein, 1996, and another (Warren and Pardew, 1998) added qualitative information about the passage success of various warm water species through specific barriers in Arkansas.

Future

In the next few months we will continue with site selection, student recruitment and equipment development.

Budget

We have had no expenditures to date because we are still in the recruiting stage for graduate students. Jesse Patton, a graduate student working on a parallel MDT funded project has been helping on this project too. In the next quarterly report, after expenditures have occurred, we will begin using our traditional graphic reporting scheme to compare planned with actual expenditures.

References

Peake, S., R.S. McKinley and D.A. Scruton. 200x. Swimming performance of Walleye (*Stizostedion vitreum*). *Can. J. Zool.* 78:1686-1690.

Tillinger, T.N. and O.R. Stein. 1996. Fish Passage Through Culverts in Montana: A Preliminary Investigation. *Federal Highway Administration* FHWA/MT/96/8117-2.

Warren, M. L. and M. G. Pardew. 1998. Road crossings barriers to small-stream fish movement. *Transaction of the American Fisheries Society* 127:637-644.